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# Performance analysis on a high-temperature solar evacuated receiver with an inner radiation shield

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## Abstract

A novel solar evacuated receiver as the key part of parabolic trough collector (PTC) was designed and constructed by authors. The novel evacuated receiver (NER) with an inner radiation shield can significantly decrease heat loss at higher operating temperatures when compared with the traditional evacuated receiver (TER). A thermodynamic model relying on the spectrum parameter model of radiation heat transfer was developed to predict the performances of evacuated receivers. Also, experiments using the novel evacuated receiver and traditional evacuated receiver were conducted in the laboratory under different parametric conditions to validate results obtained for the simulation. A comparison between simulation results and experimental data demonstrated that the model was able to yield satisfactory consistencies and predictions to a reasonable accuracy (with the root mean square deviations less than 6%). Results indicated that the novel evacuated receiver has a role in decreasing the total heat loss of receiver compared with the traditional receiver when the working temperature is higher than 296 °C, the heat loss reduction percentage of the novel evacuated

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